CAMBRIDGE ADVANCED NATIONALS

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Resource Guidance for F132: Engineering in Practice – The Mechanical Prototype

1. Universities have told us they value the practical skills students obtain from tasks and these are very important for engineers of all types.
2. The mechanically based product will be identified in the assignment brief, and it will be easily obtainable. The exact model of the product will be chosen by the centre and should be capable of disassembly and reassembly. Note that:
   - any permanent fixings such as a rivet can be removed and replaced with an alternative fixing, as long as the product's functionality is maintained.
   - the model of product should be carefully selected, so that standard forms of material supply can be used to make the prototypes. Also, the model selection should ensure the prototypes can be made using the equipment you have. For example, if a former had a 200mm x 200mm working area then relevant components in the product should be no bigger than this working area.
3. Flexibility has been built into the unit, because we know that different centres have different expertise and resources. In particular:
   - There is no set process required to manufacture the mechanical prototype. However, students must select from the manufacturing processes listed in the unit content (see Topic Area 4).
   - Students can use any metal or polymer material to manufacture their prototype from. They can also use wood for formers and/or jigs/fixtures.
   - The product in each set assignment will contain at least 3 groups of related components (sub-assemblies). We call each of these groups of related components 'prototypes'. The product in the Sample Assessment Material (SAM) contains 4 prototypes.
   - Students will choose or be allocated one of the prototypes to plan and make; they won't each be making a prototype of the whole product and they must work on their prototype independently.
   - Groups of students should ideally be able to make a mechanical prototype for the whole product e.g. if there are four prototypes in a product then four students could between them make a mechanical prototype of the product.
   - If it is not possible for a centre to make some of the different prototypes that comprise a product, then it is acceptable for students to only make the other prototypes. For example, if prototypes 1 and 4 cannot be made then each student should focus on making one of prototypes 2 and 3 only.
   - The mechanical prototypes must exclude all electrical/electronic components.
   - There is no opportunity to scale the prototypes, because then it would be difficult for students to assemble the components to create a workable mechanical prototype (see criterion D2).
4. We cannot provide centres with an exact list of what equipment they need to buy, other than to direct centres to the unit content. The emphasis is on hand held/manual equipment and it is NOT about large electronic machines. The following guidance should help centres prepare:
   - Students will need a workbench and a vice to hold and safely fabricate materials.
   - Centres will need to provide students with appropriate Personal Protective Equipment (PPE). For example, aprons and safety glasses. Health and Safety requirements will also need to be met.
   - Centres will need to provide students with appropriate hand tools. For example, under 'marking out' students will need at least one method to mark-up material, which means either a pencil, scribe and/or engineering blue. Under 'measuring' students will need a rule and/or tape measure and at least one vernier calliper is recommended for more precise and accurate measurement. Students will also need access to combination squares.
   - Centres will need to provide a couple of desk-based pillar drills and a selection of drill bits. They will also need to include a method of forming (for example, either vacuum forming or manual/machine bending equipment).
   - Centres do **NOT** need to provide any large electrical machines e.g. lathes or milling machines.

Notes:

- In the unit F132, there is also a requirement for an electronic prototype, but the resource requirements are more straightforward, so we have not provided any additional information here.
- There are many educational suppliers of the equipment required to deliver this unit, and we do not endorse any one of them.
- CLEAPSS provides health and safety advice and guidance for completing practical work in schools and colleges. Further information is available here: **https://dt.cleapss.org.uk**